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EPIDEMIOLOGY OF TUBERCULOSIS IN ONTARIO, 1999-2001

Introduction

Tuberculosis, a mycobacterial disease that has plagued humanity for millennia,[1] continues to pose a significant threat to public health worldwide. Each year more than 8 million new cases and 2 million deaths attributable to tuberculosis (TB) are reported.[2] Worldwide, among individuals 15 to 49 years of age, TB is the largest cause of death from a single agent.[3] It is the most common human infection in the world today, having infected approximately one third of the world's population.[4,5] While the vast majority of TB cases occur in the underdeveloped world, current immigration patterns result in significant numbers of persons immigrating to Canada from countries where TB is endemic (Table 1). As a result, the majority of new TB cases reported in Canada each year are identified in persons who were born outside Canada. This represents a major challenge to TB control efforts in Canada, particularly in provinces, such as Ontario, that receive a high proportion of new immigrants. In 2000, 59% of all immigrants to Canada settled in Ontario and 83% of these settled in Toronto.[6]

Table 1

Immigrants* to Canada, Main Countries of Origin and Respective Domestic TB Rates,** 2000

Country	Number[6]	TB Incidence Rate[7]
China (and Hong Kong)	40,945	107 (91)
India	28,183	184
Pakistan	14,865	175
Philippines	10,636	330
South Korea	7,608	62
Sri Lanka	6,065	58
Total (all countries)	227,336	n/a

* Includes family, economic, refugee and "other" immigrant classes.
** Estimated TB incidence rates per 100,000 population for 2000.
Source: Statistics Canada, 2002[6] and WHO, 2002.[7]

In addition to immigrants, Aboriginal peoples represent another segment of the Canadian population that bears a disproportionate burden of TB disease. In the late 1990s, age-standardized incidence rates of TB among Aboriginals were as much as twenty times higher than rates among Canadian-born non-Aboriginals.[8] Fifty-six per cent of pediatric cases in Canada reported in 1995 were among Aboriginals.[9] Factors that may help to account for these relatively high rates among Aboriginals include the large reservoir of TB infection within Aboriginal communities, inaccessibility of health care services and poor socioeconomic conditions.[8]

As well, while overall incidence rates of TB in Canada have decreased since 1980, TB rates among Canadian children have not declined.[10] Between 1975 and 1995, incidence rates for TB were consistently higher among children four years of age and younger than for those aged five to 14 years.[9] American researchers have noted that pediatric TB is on the rise in the US. The number of reported cases increased by 33% between 1985 and 1994.[11] Children with TB infection, particularly those under six years of age, are more likely than adults to develop TB disease and to develop severe forms of disease such as central nervous system and disseminated (miliary) TB.[10]

Another issue of major concern in TB control is drug-resistant TB, a particularly significant problem because there are currently only a limited number of drugs that are effective against *Mycobacterium tuberculosis*.[12] Multidrug-resistant TB (MDR-TB), defined as resistance to at least isoniazid and rifampin—the two most important drugs in TB control—is difficult to treat and requires drugs that are more toxic and expensive and less effective than first-line drugs used in TB treatment.[13] Factors that have facilitated the emergence of drug-resistant TB include inappropriately prescribed medications and incomplete treatment. These problems are especially prevalent in underdeveloped countries. Levels of resistance to at least one antituberculosis drug have been found to be significantly higher among foreign-born residents of Canada.[14,15]

These issues underline the importance of ongoing TB surveillance in Ontario and the need for dissemination of surveillance data to health care practitioners, researchers and policy makers. The present report will continue in the format of previous updates in the *Public Health and Epidemiology Report Ontario* (PHERO) and will present a discussion of the descriptive epidemiology of TB in Ontario, examining trends over the past 10 years and focusing on the period 1999 to 2001.

Methods

The *Health Protection and Promotion Act* requires that all new active and reactivated cases of TB in Ontario be reported to the local medical officer of health. Since January 1, 1990, cases have been entered into the Reportable Diseases Information System (RDIS) by health unit staff. The data are then transmitted to the Public Health Branch of the Ontario Ministry of Health and Long-Term Care in non-nominal format on a weekly basis. For the present report, TB records for the years 1992-2001 were imported from RDIS and were analyzed using SPSS 10.1 (SPSS Inc). Because records in RDIS are periodically updated, reported data may fluctuate slightly over time. As a result, there may be minor discrepancies between numbers cited in this report and those contained in other TB updates.

The RDIS definition for a case of tuberculosis is:

a) *Mycobacterium tuberculosis* complex (e.g., *M tuberculosis, M bovis* [excluding BCG strain], or *M africanum*) demonstrated on culture from sputum, body fluids, or tissues; or

b) without bacteriological proof but with clinical symptoms or signs, radiological or pathological evidence of active pulmonary or nonpulmonary disease, preferably with:

   i) a positive tuberculin skin test (as defined by the provincial guidelines) and/or;

   ii) demonstration of acid-fast bacilli in smears from sputum or other body fluids or tissues and/or;

   iii) response to antituberculosis treatment.

New active cases are defined in RDIS as those with no documented evidence or history of previous active TB, while reactivated cases are those with documented

evidence or history of previously active TB that became inactive. Inactive TB is defined as cases in which cultures for *Mycobacterium tuberculosis* have been negative for at least six months or, in the absence of cultures, chest (or other) x-rays have been stable for at least six months. Place of origin for cases is classified into three mutually exclusive categories: (1) non-Aboriginal individuals born in Canada ("Canadian-born"), (2) individuals born outside Canada ("foreign-born"), and (3) Aboriginals, including registered and unregistered Indians, Metis and Inuit. Year refers to the year of the episode date, which is defined in RDIS as the best approximation of the date of onset of the current TB disease episode.

For some variables, a maximum of four values may have been reported in RDIS for each case. These variables include medication involved in drug resistance and site of TB. The percentages cited in the present report for these variables are summaries of the reported values as a proportion of all reported values for the variable in question.

In keeping with previous TB updates in PHERO, the category of pulmonary TB includes both primary pulmonary and pulmonary TB. Respiratory TB includes pulmonary TB and other respiratory (e.g., laryngeal) TB, but not pleural or miliary TB. This definition is consistent with that used in previous PHERO reports; however, the definition of respiratory TB used in other jurisdictions may be somewhat different. Non-respiratory TB includes all cases other than those defined as respiratory TB.

For the purposes of this report, pediatric cases are defined as individuals less than 15 years of age and adult cases as individuals 15 years of age and older. Four cases within the 1992 to 2001 RDIS data set, including one case that fell within the 1999 to 2001 time period, were missing data related to age and therefore could not be categorized by this variable.

Ontario population census data and annual demographic statistics from Statistics Canada were used to calculate TB incidence rates. Average annual age-specific incidence rates for the period 1999 to 2001 were calculated as the sum of cases in each age category over the three-year period divided by the sum of the Ontario population in the corresponding age category over the three-year period, multiplied by 100,000.

There are 58 duplicate record numbers (i.e., 58 individuals for whom a second episode of TB disease was reported) entered into RDIS for the years 1992 to 2001. Twenty-three of these duplicate record numbers were reported during the period 1999 to 2001. These duplicate entries represent, for the most part, cases of reactivated TB and were included in the analyses for this report.

Results

Incidence

The trend in TB incidence in Ontario between 1945 and 2001 is depicted in Figure 1. Despite the existence of numerous peaks and valleys, TB incidence has undergone an overall decline during this time period. This downward trend continued between 1999 and 2001, with 696 reported cases in 1999, 696 in 2000 and 688 in 2001. These numbers translate into rates of 6.03 per 100,000 population, 5.94 per 100,000 and 5.78 per 100,000 for each respective year. The incidence rate of TB in Ontario is in line with that for Canada as a whole, which, in 2000, was 5.5 per 100,000.[16] However, Ontario has considerably more reported cases than any other Canadian province. In 2000, it accounted for 40% of the total number of reported TB cases in Canada and had more than twice as many cases as did Quebec, the province with the second-highest number of cases.[16]

Figure 1

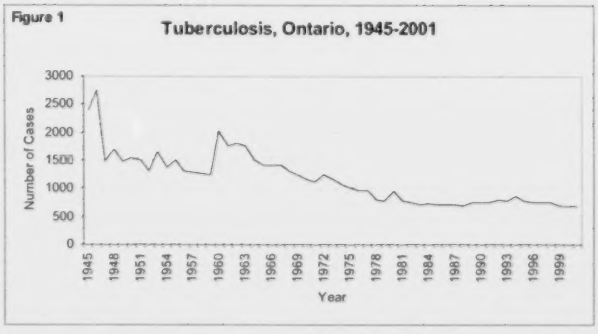


Table 2

Number of TB Cases and Incidence Rate by Year, Ontario, 1992-2001

Year	Frequency	Rate*
1992	829	7.84
1993	806	7.53
1994	863	7.97
1995	797	7.26
1996	778	7.00
1997	776	6.89
1998	741	6.50
1999	696	6.03
2000	696	5.94
2001	688	5.78

* Per 100,000 population.

The distribution of reported TB cases in Ontario by health unit between 1999 and 2001 is shown in Figure 2. Reflecting immigration patterns, the majority of reported cases were clustered in Ontario's urban centres. There was considerable variation in TB incidence rates by health unit. In 2001, the highest rates were seen in the Toronto (14.74/100,000), Northwestern (11.98/100,000), Peel (9.5/100,000) and Thunder Bay (6.54/100,000) health units (Table 3). These rates reflect the high proportion of foreign-born residents from TB-endemic areas in the Toronto and Peel health units and the high proportion of Aboriginals in the Northwestern and Thunder Bay health unit jurisdictions. Among cases whose origin was reported, foreign-born individuals comprised 88.6% and 96.8% of total reported TB cases in the Toronto and Peel health units, respectively, while Aboriginals comprised 100% and 80% of cases in the Northwestern and Thunder Bay health units, respectively.

Figure 2

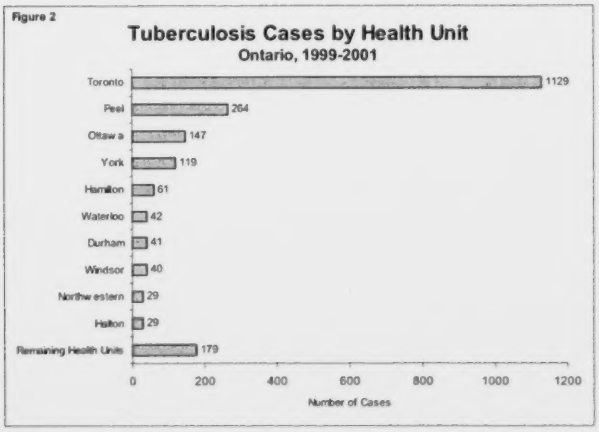


Table 3

TB Incidence by Health Unit, Ontario, 2001

Health Unit	Number	% of Total TB Cases	Rate*
Toronto	366	53.2	14.74
Peel	94	13.7	9.50
Ottawa	44	6.4	5.68
York Region	38	5.5	5.21
Hamilton	24	3.5	4.89
Durham	18	2.6	3.55
Waterloo	14	2.0	3.19
Thunder Bay	10	1.5	6.54
Halton Regional	10	1.5	2.66
Windsor-Essex	10	1.5	2.66
Northwestern	9	1.3	11.98
Niagara Regional	8	1.2	1.94
Peterborough	6	0.9	4.76
Middlesex-London	5	0.7	1.24
Kingston	4	0.6	2.24
Algoma	3	0.4	2.55
Brant County	3	0.4	2.54
Leeds	3	0.4	1.88
Perth District	2	0.3	2.71
Simcoe County	2	0.3	0.53
Hastings	2	0.3	1.32
Sudbury and District	2	0.3	1.06
Haldimand-Norfolk	2	0.3	1.91
Timiskaming	2	0.3	5.66
Chatham-Kent	1	0.1	0.92
Wellington	1	0.1	0.41
Sarnia-Lambton	1	0.1	0.80
Porcupine	1	0.1	1.17
Renfrew County	1	0.1	1.03
Muskoka-Parry Sound	1	0.1	1.24
Oxford County	1	0.1	1.00
Eastern Ontario	0	0	0
Elgin-St Thomas	0	0	0
Grey-Bruce	0	0	0
Haliburton-Kawartha	0	0	0
Huron County	0	0	0
North Bay & District	0	0	0

* Per 100,000 population.

Demographics

Between 1999 and 2001, 978 (47.0%) of the reported TB cases were female and 1,102 (53.0%) were male. There also appeared to be distinct gender differences among cases based on origin. Among foreign-born cases, there was a fairly even split between females and males, while the majority of Canadian-born cases were males. Among Aboriginals, on the other hand, the majority of cases were females (Table 4).

Table 4

Tuberculosis Cases by Gender and Origin,* Ontario, 1999-2001

	Number (%) Foreign-Born		Number (%) Canadian-Born		Number (%) Aboriginal	
Year	Female	Male	Female	Male	Female	Male
1999	292 (49.6)	297 (50.4)	28 (35.4)	51 (64.6)	7 (50.0)	7 (50.0)
2000	295 (49.5)	301 (50.5)	27 (37.5)	45 (62.5)	10 (83.3)	2 (16.7)
2001	262 (46.5)	301 (53.5)	18 (22.5)	62 (77.5)	13 (65.0)	7 (35.0)
Total	849 (48.6)	899 (51.4)	73 (31.6)	158 (68.4)	30 (65.2)	16 (34.8)

* Excludes 55 cases with unspecified, unknown or missing data for origin variable.

The age distribution of cases and age-specific rates of TB by gender, which depict the average annual risk of disease for each age group from 1999 to 2001, are depicted in Figure 3. The greatest number of cases was found within the 30-to-39-year old and 70 years and older age categories, for both female and male cases. TB incidence rates demonstrated a bimodal distribution for both females and males, with peaks in the 25-to-29-year age categories and in the 70 years of age and older categories. Between the ages of 10 and 19 years, 25 and 29 years, and 50 and 59 years the rates for female cases were higher than those for male cases. The largest gender differential in rates is seen in cases 70 years of age and older, when the rate for male cases (19.72 per 100,000) was almost twice the rate for female cases (10.41 per 100,000).

Figure 3

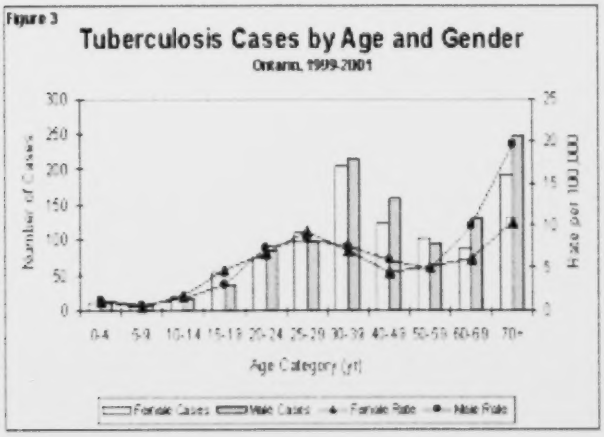
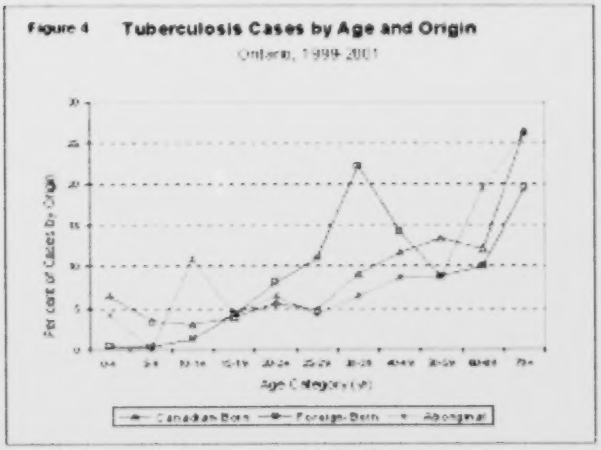


Figure 4 Tuberculosis Cases by Age and Origin



Age Category	Canadian-Born	Foreign-Born	Aboriginal
0-4	13	7	1
5-9	5	6	0
10-14	7	23	5
15-19	5	75	2
20-24	11	142	3
25-29	11	192	2
30-39	21	387	3
40-49	27	245	4
50-59	33	153	4
60-69	29	174	5
70+	61	340	12

Age Category	Canadian-Born	Foreign-Born	Aboriginal
0-4	6.1	0.4	4.3
5-9	3.5	0.3	0
10-14	3	1.3	10.9
15-19	3.9	4.3	4.3
20-24	5.6	8.1	6.5
25-29	4.8	11	4.3
30-39	4.1	22.2	6.5
40-49	11.7	14.2	8.7
50-59	13.4	8.8	8.7
60-69	14.1	10	10.9
70+	29.4	19.5	26.1

Table 5

Tuberculosis Cases by Age and Origin, Ontario, 1999-2001

Age Categories (yr)	Number* (%) of Cases		
	Foreign-Born	Canadian-Born	Aboriginal
0-14	36 (2.1)	30 (13.0)	7 (15.2)
15-59	1,197 (68.5)	112 (48.5)	18 (39.1)
60+	514 (29.4)	89 (38.5)	21 (45.7)
Total (all ages)	1,747 (100)	231 (100)	46 (100)

* Excludes 55 cases with unspecified, unknown or missing data for origin variable and one case with missing data for age variable.

Table 6

Ages of Foreign-Born TB Cases from Most Common Countries of Origin, Ontario, 1999-2001

Country	Median Age (yr)	Minimum Age (yr)	Maximum Age (yr)
Somalia	29.0	10	79
Ethiopia	33.0	15	68
Sri Lanka	36.0	17	84
Pakistan	36.5	4	86
Vietnam	37.0	1	88
India	38.0	10	93
Korea, South	38.5	7	88
Philippines	41.0	0	89
Hong Kong	47.0	14	92
China	62.0	20	106

Pediatric cases comprised 15.2% of total cases among Aboriginals, 13.0% of all Canadian-born cases and only 2.1% of all foreign-born cases (Table 5). The proportion of cases between the ages of 15 and 59 years was 39.1% for Aboriginal, 48.5% for Canadian-born and 68.5% for foreign-born individuals. Cases 60 years of age and older represented 45.7% of all Aboriginal cases, 38.5% of Canadian-born cases and 29.4% of foreign-born cases. Figure 4 depicts these age distributions by origin graphically.

The median age of cases between 1999 and 2001 was 42 years, 40 years for female cases and 44 years for male cases. Differences in median age, based on origin, were noted among the cases. For foreign-born cases the median age was 41 years, while for Canadian-born and Aboriginal cases it was 50 and 57 years, respectively. Among foreign-born cases, differences in median age, based on country of origin, were also noted, with the lowest median ages seen in cases from Somalia and Ethiopia and the highest median age seen in cases from China (Table 6).

Origin

Foreign-born individuals continue to comprise the

overwhelming majority of newly reported TB cases in Ontario. Between 1992 and 2001, 81.6% of TB cases were foreign-born, 13.7% were Canadian-born, 2.5% were Aboriginal and 2.2% of cases had unspecified, unknown or missing data for the origin variable. Among foreign-born cases, India (12.0%), Vietnam (11.2%), the Philippines (10.3%) and China (10.3%) were the most common countries of origin.

Between 1999 and 2001, 84.0% of reported cases were foreign-born, 11.0% were Canadian-born, 2.2% were Aboriginal and 2.6% had unspecified, unknown or missing data for the origin variable. The most frequently reported countries of origin among foreign-born cases were India (14.5%), the Philippines (10.9%), China (10.6%) and Vietnam (9.2%) (Table 7). This is a function of both the rates of TB in these countries and immigration patterns.

Table 7

Most Common Countries of Origin for Foreign-Born TB Cases, Ontario, 1999-2001

Country	Number	Per cent of Total Foreign-Born Cases	TB Incidence Rate* in Country of Origin
India	249	14.5	184
Philippines	188	10.9	330
China	183	10.6	107
Vietnam	159	9.2	189
Hong Kong	99	5.7	91
Somalia	94	5.5	360
Pakistan	86	5.0	175
Sri Lanka	55	3.2	58
Ethiopia	49	2.8	397
Korea, South	48	2.8	62

* Estimated TB incidence rates per 100,000 population for 2000.
Source: WHO, 2002.[7]

Case Ascertainment, Clinical Presentation and Mortality

The majority (77.4%) of cases reported between 1999 and 2001 were detected through symptomatology. The remainder were detected through immigration screening (6.9%), routine screening (4.8%), contact tracing (3.8%), and post-mortems (0.5%). For 5.3% of cases, detection was through other means and for 1.3% of cases, the method of case ascertainment was unknown or unreported.

Excluding cases with no data related to staging, 90.2% of all cases reported between 1999 and 2001 were new active and 9.8% were reactivated. The distribution of reported TB sites for all cases between these years is shown in Figure 5. A total of 62.4% of reported sites were respiratory and 37.6% were non-respiratory. Respiratory TB

Figure 5

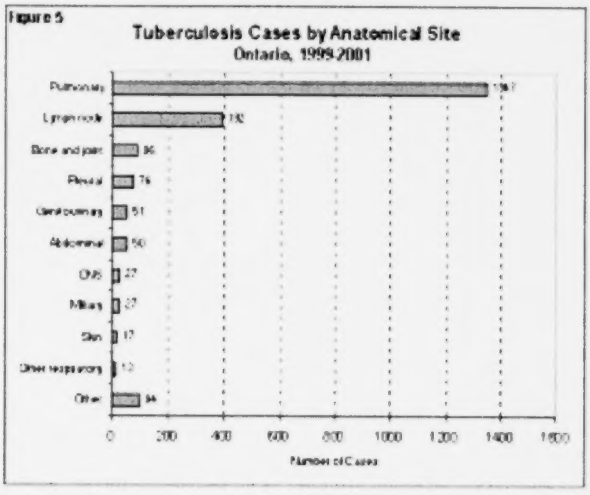


Figure 6

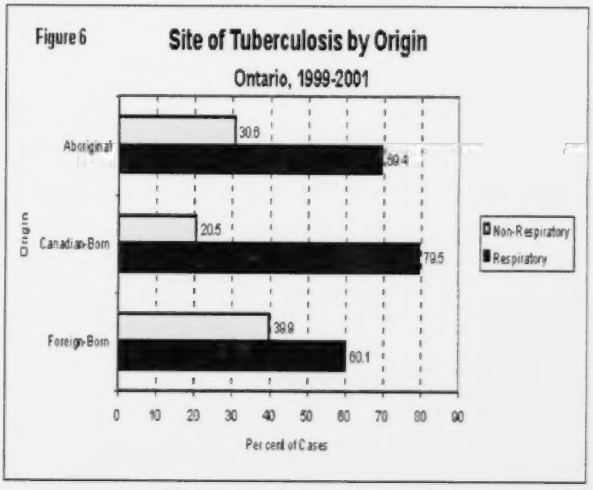
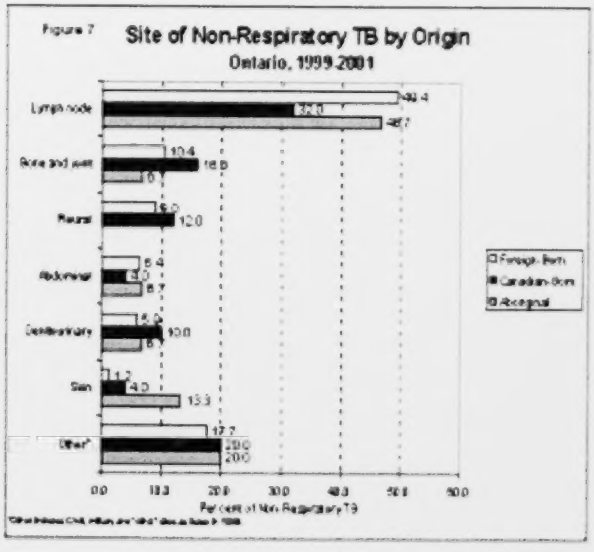


Figure 7



represented a larger proportion of total cases among Canadian-born (79.5%) compared to Aboriginal (69.4%) and foreign-born (60.1%) cases (Figure 6). The distribution of non-respiratory TB sites by origin is presented in Figure 7. Among cases with non-respiratory TB, the most common site was the lymph nodes, reported in 49.4% of foreign-born cases, 46.7% of Aboriginal cases and 32.0% of Canadian-born cases. Compared to cases of foreign-born and Aboriginal origin, higher proportions of bone and joint, pleural and genitourinary TB were noted among Canadian-born cases.

Between 1999 and 2001, 197 cases were reported to have died, 72 (36.5%) female and 125 (63.5%) male. Among those for whom data on cause of death were reported, tuberculosis was the underlying cause of death in 32 (16.7%), a contributing cause of death in 69 (35.9%), an incidental finding in 73 (38.0%) and of unknown significance in 18 (9.4%) cases. When categorized by origin, 144 (8.2%) foreign-born, 35 (15.2%) Canadian-born and 8 (17.4%) Aboriginal cases died. Among reactivated cases, 33 (16.6%) deaths were reported, compared to 159 (8.7%) among new active cases; 5 cases who died had no data on staging. Seventeen (7.5%) of the cases with resistance to one or more anti-tuberculosis drugs were reported as deceased, while 141 (10.1%) cases with no reported drug resistance died. Two (9.5%) of the MDR-TB cases died.

Pediatric Cases

Between 1992 and 2001 there was a total of 351 cases of pediatric TB reported in Ontario (Table 8), 51% female and 49% male. Excluding the four cases for whom origin was unknown, unspecified or unreported, 56.5% of total pediatric cases were foreign-born, 37.2% were Canadian-born and 6.3% were Aboriginal. Among the children born outside Canada, the most frequently cited country of origin was Somalia, followed by the Philippines and Vietnam.

Table 8

Number of Pediatric Tuberculosis Cases, Ontario, 1992-2001

Year	Frequency	Per cent of Total TB Cases	Rate*
1992	38	4.6	1.77
1993	40	5.0	1.83
1994	53	6.1	2.40
1995	36	4.5	1.61
1996	41	5.3	1.81
1997	24	3.1	1.05
1998	45	6.1	1.97
1999	17	2.4	0.74
2000	26	3.7	1.14
2001	31	4.5	1.35

* Number of cases less than 15 years of age per 100,000 children less than 15 years of age.

Table 9

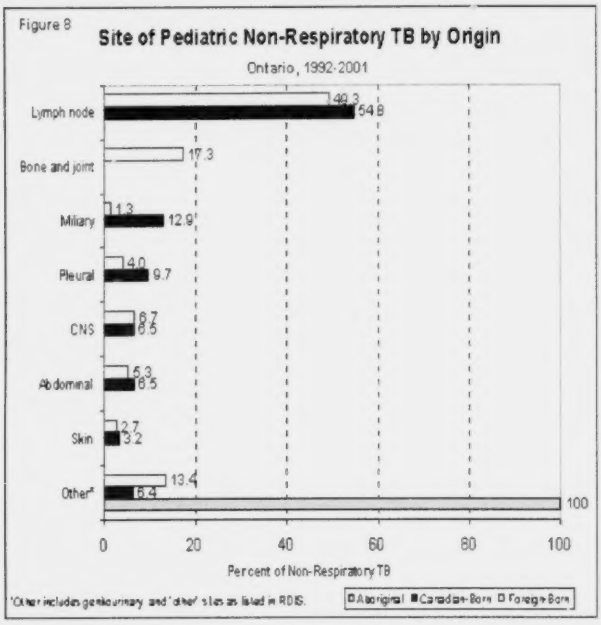
Most Common Countries of Origin for Foreign-Born Pediatric TB Cases, Ontario, 1999-2001

Country	Number	% of Total Foreign-Born Pediatric Cases
Somalia	7	19.4
Philippines	5	13.9
Pakistan	5	13.9
Other Asian countries	8	22.2
Other African countries	7	19.4
Latin America	2	5.6
Other	2	5.6

Seventy-four of the pediatric cases were reported between 1999 and 2001, 36 (48.6%) female and 38 (51.4%) male. Excluding the one case for whom origin was not reported, 49.3% of cases during this time period were foreign-born, 41.1% were Canadian-born and 9.6% were Aboriginal. The most common countries of origin for foreign-born pediatric cases between 1999 and 2001 were Somalia, the Philippines and Pakistan (Table 9). The greatest proportion (48.6%) of pediatric cases was in the 10-to-14-year age category, while 32.4% were aged 0 to 4 years and 18.9% were aged 5 to 9 years. The median age of pediatric cases was 9 years, 10 years for females and 8 years for males.

Among pediatric cases between 1992 and 2001, 69.3% of total reported sites were respiratory and 30.7% were non-respiratory. Between 1999 and 2001 the distribution of sites was similar: 70.7% respiratory and 29.3% non-respiratory. When the 1992 to 2001 data are categorized by origin, Aboriginals had the highest proportion of respiratory TB, at 95.5% of total cases, compared to 76.5% among Canadian-born and 61.7% among foreign-born pediatric cases. The distribution of non-respiratory TB sites by origin among pediatric cases is presented in Figure 8. A total of 54.8% of Canadian-born and 49.3% of foreign-born cases with non-respiratory TB had TB of the lymph nodes. Compared to other cases, foreign-born cases had a higher proportion of bone and joint TB (17.3%) and Canadian-born cases had a higher proportion of miliary TB (12.9%).

Figure 8



Risk settings for pediatric and adult cases between 1999 and 2001 are compared in Table 10. Travel to, or residence in, a TB-endemic country was reported as the risk setting for 52.7% of pediatric cases and 76.2% of adult cases. Risk setting was reported as home for 33.8% of pediatric cases and 7.1% of adult cases. While living in or visiting a TB-endemic country was the primary risk setting for foreign-born pediatric cases, the home was the risk setting for predominantly Canadian-born pediatric cases. Among pediatric cases for whom home was the risk setting, 76% were Canadian-born, 12% were foreign-born and 12% were Aboriginal. Eighty-four per cent of pediatric cases with home as their reported risk setting were detected through contact tracing. Forty per cent were under 5 years of age, 28% were 5 to 9 years of age and 32% were 10 to 14 years of age. The median age of these children was 6 years.

Table 10

Risk Settings, Pediatric and Adult TB Cases, Ontario, 1999-2001

Risk Setting	Number (%) of Pediatric Cases	Number (%) of Adult Cases
Travel/Residence in TB-Endemic Country	39 (52.7)	1,527 (76.2)
Home	25 (33.8)	143 (7.1)
Shelter/Rooming house	0 (0)	30 (1.5)
Workplace	0 (0)	19 (0.9)
Hospital	0 (0)	11 (0.5)
Residential Facility	0 (0)	11 (0.5)
Correctional Facility	0 (0)	9 (0.4)
Daycare	0 (0)	0 (0)
School and Other	3 (4.1)	24 (1.2)
Unknown/Unspecified	7 (9.5)	231 (11.5)
Total	74 (100)	2,005 (100)

Drug Resistance

Between 1992 and 2001, there were 731 cases with reported drug resistance (i.e., resistance to one or more drugs), 12.5% of all culture-positive cases. During the three-year period 1999 to 2001, 228 cases were reported to have drug resistance, 13.7% of all culture-positive cases. A total of 63.6% of cases with reported drug resistance had resistance to only one drug, while 20.0% had resistance to a total of three or more drugs. Excluding cases with unreported or unspecified data, 21.7% of cases with resistance to at least one drug were reactivated cases of TB. Although there was a 45.9% increase between 1998 and 1999 in the number of reported drug-resistant cases, a steady decline in the number of such cases occurred between 1999 and 2001. During this time period, drug-resistant cases decreased from 91 in 1999 to 61 in 2001, representing a decline from 16.2% to 11.0% of total culture-positive cases (Figure 9).

Figure 9

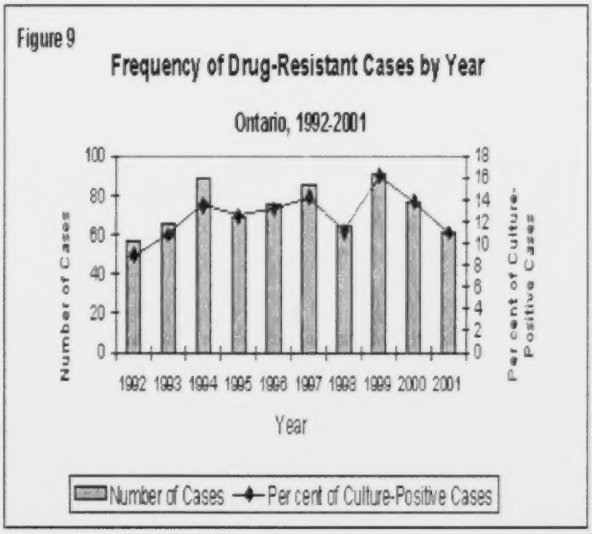


Table 11

Drug-Resistant TB Cases by Origin and Year, Ontario, 1999-2001

Year	Number* (%)** of Cases			
	Foreign-Born	Canadian-Born	Aboriginal	Total
1999	84 (17.5)	7 (11.7)	0 (0)	91 (16.5)
2000	68 (14.3)	6 (12.0)	0 (0)	74 (13.8)
2001	55 (12.1)	3 (4.8)	0 (0)	58 (10.9)
Total	207 (14.7)	16 (9.3)	0 (0)	223 (13.8)

* Excludes all cases with unknown or unspecified drug-resistance status or origin.
** Per cent of total culture-positive cases by origin and year.

Table 12

Drug-Resistant TB in Foreign-Born Cases from Most Common Countries of Origin, Ontario, 1999-2001

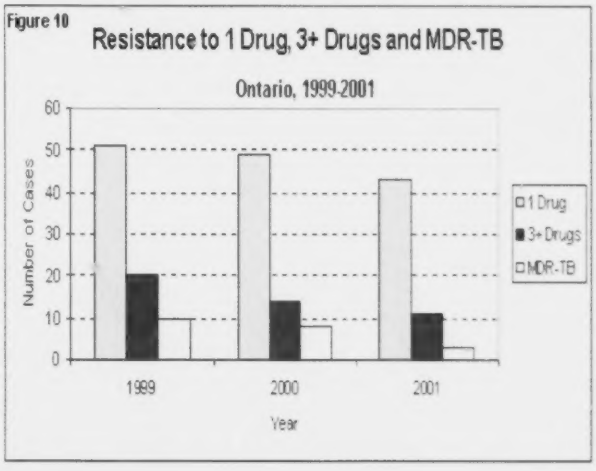
Country	Total Number of Culture-Positive Cases	Number (%)* of Drug-Resistant Cases
Vietnam	133	37 (27.8)
Philippines	151	30 (19.9)
India	191	20 (10.5)
China	160	18 (11.3)
Hong Kong	80	10 (12.5)
Korea, South	42	9 (21.4)
Ethiopia	43	7 (16.3)
Somalia	65	6 (9.2)
Sri Lanka	43	6 (14.0)
Pakistan	68	5 (7.4)

* Per cent of total culture-positive cases by country.

Drug-resistant cases categorized by origin are shown in Table 11. Between 1999 and 2001, the highest frequencies of resistance were seen in foreign-born cases, while no drug resistance was reported among Aboriginals. Among foreign-born cases from countries with the highest frequencies of reported TB in Ontario, the highest proportions of drug resistance as a percentage of total culture-positive cases were seen in cases from Vietnam, South Korea and the Philippines (Table 12).

The frequency of drug-resistant TB by age category is shown in Table 13. The lowest percentage (6.6%) of drug-resistant cases as a percentage of total culture-positive cases by age was found among cases 70 years of age and older. The highest percentages were found among cases between 0 and 9 years of age. However, caution should be exercised when interpreting these high percentages. Because only a minority of pediatric cases under 10 years of age were diagnosed through culture, calculations of drug resistance based on the total number of culture-positive cases within each age category may produce artifactually high levels of drug resistance among cases within the lowest age groups.

Figure 10



Seventy-three cases of MDR-TB (1.2% of all culture-positive cases) were reported between 1992 and 2001. Examination of these data by individual year demonstrates that the number of reported cases decreased between 1999 and 2001. There were 21 reported cases of MDR-TB during this time period, 10 in 1999, 8 in 2000 and 3 in 2001 (Figure10). These numbers represent 1.8%, 1.5% and 0.5% of total culture-positive cases for each respective year. Between 1992 and 2001, 28.8% of MDR-TB cases were reactivated TB.

The frequency of resistance to individual drugs used in tuberculosis treatment is shown in Table 14 for the period

Table 13

Drug-Resistant TB Cases by Age Category, Ontario, 1999-2001

Age Category (yr)	Total Number of Culture-Positive Cases	Number (%)* of Drug-Resistant Cases
0-4	7	4 (57.1)
5-9	2	1 (50.0)
10-14	22	3 (13.6)
15-19	73	10 (13.7)
20-24	125	17 (13.6)
25-29	167	32 (19.2)
30-39	330	54 (16.4)
40-49	214	42 (19.6)
50-59	147	20 (13.6)
60-69	184	19 (10.3)
70+	392	26 (6.6)
Total	1,663	228 (13.7)

* Per cent of total culture-positive cases by age category.

Table 14

Resistance to Individual TB Drugs, Ontario, 1992-2001

Drug	Number (%)* of Cases			
	1992-2001	1999	2000	2001
Isoniazid/INH	554 (9.5)	70 (12.5)	44 (8.0)	40 (7.2)
Streptomycin	294 (5.0)	43 (7.7)	32 (5.8)	27 (4.9)
Rifampin	81 (1.4)	10 (1.8)	10 (1.8)	3 (0.5)
Pyrazinamide	75 (1.3)	7 (1.2)	12 (2.2)	12 (2.2)
Ethambutol	66 (1.1)	13 (2.3)	9 (1.6)	5 (0.9)
Ethionamide	31 (0.5)	7 (1.2)	9 (1.6)	6 (1.1)
Ciprofloxacin	4 (0.1)	0 (0)	0 (0)	0 (0)
Capreomycin	2 (0)	0 (0)	0 (0)	0 (0)
Rifabutin	2 (0)	0 (0)	0 (0)	2 (0.4)
Cycloserine	1 (0)	0 (0)	0 (0)	0 (0)

* Per cent of total culture-positive cases.

1992 to 2001, as well as the years 1999 to 2001 individually. In all years, isoniazid was the drug most frequently involved in drug resistance; however, resistance to this drug declined from 12.5% of total culture-positive cases in 1999 to 7.2% in 2001. Resistance to streptomycin, the second most frequently reported drug involved in resistance, also decreased, from 7.7% of total culture-positive cases in 1999 to 4.9% in 2001. Only resistance to pyrazinamide and rifabutin increased between 1999 and 2001. These increases must be followed over time to determine whether they represent a significant trend.

Discussion

Between 1999 and 2001, the overall number of TB cases reported each year in Ontario remained relatively steady, decreasing slightly in 2001, and the incidence rate fell from 6.03 per 100,000 to 5.78 per 100,000. However, examination of the data reveals subgroups within the overall number of TB cases that bear a disproportionate burden of TB disease. Most significant in terms of number of cases are foreign-born individuals, who continue to comprise the vast majority of TB cases in Ontario. As well, although the number of Aboriginal cases in Ontario is relatively small, TB incidence among this segment of the population remains relatively high.

While overall incidence rates in Ontario declined between 1999 and 2001, rates for pediatric cases rose during this time period, increasing from 0.74 per 100,000 in 1999 to 1.35 per 100,000 in 2001. Compared to adult cases, there was a higher proportion of Canadian-born and Aboriginal individuals among pediatric cases and a lower proportion of foreign-born individuals. The home was a more significant risk setting for pediatric cases than for adult cases, particularly for pediatric cases born in Canada. In 1995, more than 64% of Canadian-born pediatric TB cases under 10 years of age were children of immigrants.[17] First-generation Canadian-born children may be acquiring TB from their foreign-born family members. This is an aspect of TB control that requires further study.

There was a decrease in the number of cases with resistance to one or more anti-tuberculosis drugs between 1999 and 2001. Also noted were decreases in drug resistance for most individual TB drugs and in the frequency of MDR-TB. No drug resistance was reported among Aboriginal cases between 1999 and 2001. A higher proportion of drug resistance was reported among foreign-born cases than among Canadian-born cases; however, the proportion of drug resistance declined between 1999 and 2001 for both groups. The majority of cases with reported drug resistance were less than 40 years of age. A higher proportion of reactivated TB was noted among cases with drug resistance, particularly MDR-TB, than among cases with no drug resistance.

Acknowledgements

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Communiqué

Public Health Research, Education and Development Program

MIDDLESEX-LONDON HEALTH UNIT

Middlesex London Teaching Health Units

EDUCATION/STUDENT PLACEMENT COORDINATION IN PUBLIC HEALTH

Introduction

Since its launch as a pilot project in 1984, the Teaching Health Unit Program has had a strong commitment to student education. And this tradition continues through the Public Health Research Education & Development (PHRED) Program. During 2002, the province's five PHRED Programs provided more than 1200 student placements, participated in classroom teaching and over the years have formalized ongoing partnerships with academic institutions as outlined in Table 1.

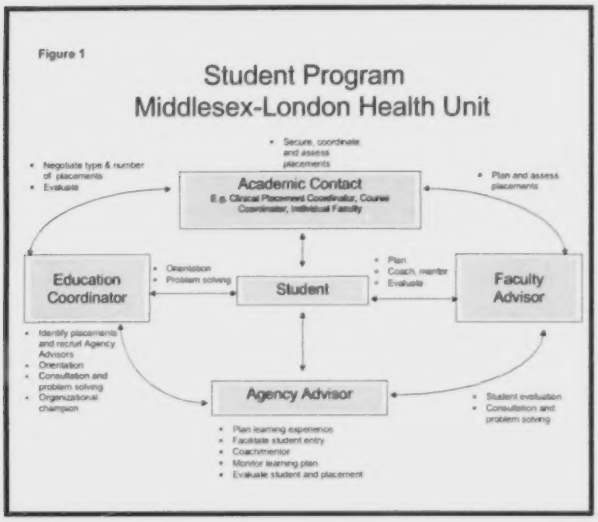
Table 1: Academic Affiliations by PHRED Site

City of Hamilton	McMaster University and University of Guelph
Kingston, Frontenac and Lennox & Addington Health Unit	Queen's University
Middlesex-London Health Unit	The University of Western Ontario and Brescia University College
City of Ottawa	The University of Ottawa
Sudbury & District Health Unit	Laurentian University

In addition to the role played by the PHRED Programs, many health units across the province provide significant learning opportunities for both undergraduate and graduate students. Many of our staff, including the authors, received their first exposure to public health as students through Middlesex-London Health Unit (MLHU). Indeed, an investment in post-secondary student education is important to the future and sustainability of public health in Ontario.

This article describes MLHU's experiences in providing student learning opportunities, including benefits and challenges, types of placements provided, required infrastructure, lessons learned and recommendations. It is our intent that these observations will offer useful insights and concrete strategies that can be customized by others. A contact for student education activities is included for each PHRED Program, as well as an invitation to link with a newly formed network, PHRED-Connection. Figure 1 provides an overview of MLHU's Student Program.

Figure 1



Prerequisites for Successful Placements

There are a number of prerequisites for a successful placement as shown in Table 2. At MLHU, the PHN, Education Coordinator is the dedicated health unit contact. This role has evolved. Originally, most placements were for nursing students. As a result, a Nursing Supervisor carried this role as part of her program responsibilities. When MLHU became a Teaching Health Unit (THU), the THU staff assumed this role and coordinated all post-secondary student placements across the agency.

The amount of time required is dependent on the number of requests and may require minimal commitment. During 2002, this part-time position included other related assignments and handled 219 placements. With the restructuring of our PHRED Program, this role has been expanded and will increase to full time status. MLHU's Education Coordinator works closely with faculty and health unit staff to negotiate and recruit placements. This frees up manager and staff time to concentrate directly on the student's learning experience.

Table 2

Prerequisites for Successful Student Placements

- Dedicated health unit contact
- Affiliation Agreement or Letter of Understanding with academic partner(s)
- Ongoing dialogue between faculty and health unit staff
- Clearly defined roles and explicit expectations, e.g., agency advisor, faculty advisor, student
- Faculty support and availability
- Policies re liability, authorship, data ownership etc.
- Identified guidelines/principles to address conflict
- Sufficient orientation for agency advisors, students, faculty
- Mentoring and support for staff serving as agency advisors
- Ongoing monitoring, evaluation and opportunity to debrief
- Staff recognized for their role with students, including dedicated time allocated to accommodate the assignment, i.e., not an "add-on"
- An organizational champion

Recently, the School of Nursing, University of Western Ontario (UWO) introduced a Clinical Placement Coordinator position. Having this position within the School of Nursing has streamlined the process for negotiating placements, reduced the number of required contacts and promoted consistency in the placement process. Having such a position in all education settings is highly desirable.

The health unit contact requires current knowledge of course requirements and a clear understanding of course objectives in order to maximize the fit between the student's learning needs and health unit expectations. The health unit contact:

- ensures that placements occur in a consistent manner throughout the agency
- searches out new opportunities for student learning
- recruits agency advisors
- arranges orientation for staff and students regarding roles and placement expectations
- handles placement difficulties, and
- evaluates placements and shares results with health unit and faculty decision-makers.

Ideally the health unit and academic partner should have an Affiliation Agreement or at a minimum a Letter of Understanding outlining the expectations of each partner. Similarly, each partner requires policies to address liability issues. Such policies must be reviewed on a regular basis in order that health unit staff, students and the educational facility are protected in case of a claim.

With few exceptions, monetary stipends are not offered within the MLHU student placement program. Most recently, a monthly mileage allowance of up to $50.00 has been granted to students having a synthesis experience of three months or more. Students working in the county and incurring significant expenses especially welcomed this change in policy.

Value Added Through Student Placements

Often, students allow the health unit to undertake projects that otherwise staff would be unable to accommodate due to insufficient resources, competing priorities or limited time. Interactions with students prompt staff to reflect and examine organizational practices, and their own ways of thinking and doing. Encouraging students to share their projects, including resources they have developed and to present their experiences at health unit symposiums or at team meetings can provide useful vehicles for organizational learning.

Providing placements for graduate students may offer longer-term investments. The graduate student's course work, independent study or research can significantly advance health unit projects and produce quality products with more immediate utility. Graduate students can be a valuable resource for conducting program evaluations, reviews of the literature, addressing real world research questions and providing consults regarding organizational development and other management issues. Having a list of such projects well articulated and "ready to go" can be instrumental in recruiting graduate students. Where possible, offering in-kind supports or a small stipend can be attractive incentives for graduate students.

This is an era of early retirements. Recruitment of new staff through the student placement program is both strategic and economically wise. Students offer a pool of potential applicants equipped with the necessary knowledge and beginning skills to give both the agency and the new employee a head start. Students can learn roles in a supervised setting, while determining if there is a fit with their career goals, and the health unit can simultaneously assess their suitability for employment. Table 3 highlights how student placements can benefit both the health unit and students.

Table 3: Value Added Through Student Placements

Health Unit	Student/Educational Institution
• Enhances current and future capacity	• Allows student to experience "real world"/ real time learning
• Promotes exposure to new ways of thinking and doing	• Provides feedback to assess curriculum adequacy
• Supplies a potential pool of new recruits with health unit experience	• Offers opportunities to integrate theory into practice
• Offers access to faculty expertise and new resources	• Offers access to practice experts

Student Experiences at MLHU

A number of different types of experiences are provided ranging from half day observational experiences to placements over a full semester or to a synthesis experience where the student becomes fully integrated into the health unit. Students from a number of disciplines, including medicine, nursing, social work, epidemiology, environmental health, health sciences and nutrition have had placements. The majority of students are undergraduates.

All staff are expected to track time spent with students and to provide feedback about the placement. Students are also invited to evaluate their placement and to provide their agency advisor with feedback. These data are vital to the student program and assist the Education Coordinator in planning and improving the program.

We have found that a triad partnership between student, faculty and public health practitioner is an effective model. Negotiating roles for each member of the triad is vital. Although, the faculty advisor is responsible overall for the final grade, for most placements the agency advisor evaluates the student's performance and provides written feedback.

The following describes three exemplars of student placements:

1. Medical Students

In 2002, a group of second year UWO medical students completed a practicum with tykeTALK, a pre-school speech and language program, administered by Middlesex London Health Unit. The students developed an information package on speech and language problems for health care

professionals and hosted a Saturday morning seminar for family physicians to distribute the package. This example demonstrates how the students' project facilitated the health unit's work, provided a useful resource and extended a program's reach.

2. Nursing Students

Each year we provide a 12-week synthesis experience for at least four, fourth year nursing students. It can be challenging recruiting students for this placement, as often, graduating students believe they need to consolidate in the acute care sector. We have found it beneficial to request class time to promote this placement and to have a former student share their experiences. The agency advisors referred to as preceptors receive a two-hour comprehensive workshop to prepare them for their role in working with students. This interactive workshop facilitated by the Education Coordinator and Faculty Advisor engages participants in problem solving common scenarios and includes such topics as coaching, providing feedback, writing evaluations, and developing a learning plan with the students. Each preceptor receives a Preceptor Manual to complement the workshop.

Overall, the students have found this a very positive experience, as evidenced by the following comments:

"….. you get to work independently, but are provided with guidance. I was given my own assignment of seven schools."

" I have learned a great deal…. about what is involved in health promotion – coordination, communication, politics (both internal and external), and the great amount of effort put forth by PHNs to launch a project or program. The possibilities and challenges are endless….. It is an extremely exciting field……".

3. Nutrition Students

Since 2001, groups of fourth year nutrition students from Brescia University College conduct a nutrition needs assessment and an education session with elementary school students in a selected number of schools. This project highlights the benefits of academic and service partnerships. The students gain practical and relevant community experience; the schools and MLHU receive data that is being used for program planning and service delivery, and; a PHRED program of research focusing on childhood obesity is being advanced. As a direct result of this project, one school in a low-income area established a breakfast-for-learning program after discovering that 30% of their students skipped breakfast.

Other Commitments to Student Education

In addition to providing placements, staff also provide on-campus guest lectures and participate in student seminars at the health unit. Middlesex-London PHRED Researcher/ Educators spend up to 40% of their time teaching. Some health unit managers have assumed a one-semester faculty role. This model can be especially beneficial in promoting a public health agenda and relevant course content within the curriculum, and in providing experts in the field when faculty resources are limited. Two models of remuneration have been utilized: 1) the health unit is reimbursed for the time required, and 2) in exchange, equivalent time is made available to the health unit by faculty for consultations, research, workshops etc.

Challenges

As with any endeavor, challenges do occur. There have been examples of conflict including situations of interpersonal friction between the student and agency advisor and where student and agency expectations have differed. Although infrequent, it is imperative to have guidelines and principles developed proactively to deal with such occurrences. Ideally as a first step, conflict is addressed directly by the student and agency advisor. The Education Coordinator and faculty are available to act as resources. This highlights the importance of ensuring a good fit with the student, agency advisor and placement, and a consistent philosophy of teaching and learning between the health unit and educational institution. For some placements such as for graduate students and the Nursing Preceptor Program, the prospective student and agency advisor meet prior to the experience to determine the suitability of the placement. The Education Coordinator is also available on a regular basis for consultation with the agency advisor and the student.

Other challenges include illness on the part of the student or agency advisor, an inappropriate placement or a group of students who do not work well together. There is an ongoing need to advise faculty of changing practice trends, including role expectations of health unit staff to ensure that such changes are accurately reflected in the curriculum and in placement requests.

There can be periods of decreased interest in taking students. It is critical to explore the rationale behind this

occurrence. In our setting, reductions occur for many reasons such as: a team's increased workload, changes in personnel, individual or team stress, restructuring, lack of feedback from faculty and/or the Education Coordinator, lack of recognition of previous efforts, and student overload etc. Due to staff attrition and new assignments, some advisors are subject to burnout due to multiple assignments with students. If quality placements are to be delivered, it is important to respect these realities and to let faculty advisors know what is feasible, and when a more favourable environment is expected.

Increased enrolment in health care programs has created an increased demand for student placements, which in turn places a greater demand on health unit staff. Because of the heavy demand for placements, we have encouraged area health units to open their doors and specifically suggested that the UWO School of Nursing seek out other health unit placements in the southwest, as well as explore other community-based opportunities. Many partners can enrich the students' learning.

New Directions

Working with students can be both personally rewarding, challenging and time consuming. Hence, to maximize our impact as much as possible, we are increasingly focusing on influencing curriculum and providing placements that are consistent with health unit needs. This increasing shift to a curriculum focus is especially timely as a collaborative nursing program between college and university faculty is being developed and implemented and a satellite to UWO's medical school is opening. Similar opportunities for involvement in curriculum development exist across the province.

We are looking at creative ways to make students aware of learning opportunities within the health unit by providing sufficient information to assist students in selecting their placements. A module is currently being developed for posting on our website.

Lessons Learned/Recommendations

We have identified a number of "lessons learned" from our experiences and offer the following as recommendations for others to consider:

1. Initiate dialogue and explore linkages with potential academic partners.
2. Identify a consistent health unit contact to facilitate all student placements.
3. Ensure that the health unit contact is up to date regarding changes in curriculum, and placement needs and has opportunity to provide input for curriculum renewal and development.
4. Allow sufficient time to plan placements and to recruit staff.
5. Maintain regular contact with faculty.
6. Provide opportunities for faculty development e.g. orientation for new faculty, placements or short-term employment.
7. Ensure that there is a good fit between the student's learning objectives and the needs of the health unit.
8. Articulate clear role expectations for the agency advisor and the faculty advisor.
9. Plan for the unexpected, e.g., have back-up placements and agency advisors.
10. Legitimize the role of mentoring students and provide the necessary time and infrastructure supports e.g. reduced assignment, orientation and "mentoring the mentor".
11. Check in with agency advisors on a regular basis to ensure that expectations are being met and there are no surprises, e.g., failing student.
12. Provide opportunities for students to disseminate their projects and share their experiences.
13. Evaluate placements from the students' and agency advisors' perspectives; debrief with participants and modify placements as needed in consultation with faculty colleagues.
14. Explore with your academic partner(s) how to recognize staff who provide student learning opportunities, e.g., reduced tuition for a course, research day or campus workshop; certificate of merit; reception; acknowledged in agency and campus newsletters; gift certificate for campus bookstore; documented on annual performance review etc.
15. Develop a roster of potential graduate student placements.
16. Share resources with others, avoid reinventing the wheel and customize resources developed by others, e.g., orientation outlines, evaluation tools etc.
17. Identify opportunities to engage faculty in health unit activities, e.g., consultations, workshops, research etc.

An Invitation

Education/Student Placement Coordinators in each of the five PHRED Programs have formed a network, known as PHRED-Connection. The purpose of the network is to provide an opportunity to share ideas and resources and to explore ways to work collaboratively on common projects. Recognizing that the PHRED Program is committed to disseminating effective public health practices, Education/ Student Placement Coordinators from other health units are invited to link with the network by contacting Nicole Ritz at 905-546-2424 ext. 4648 or by email nritz@hamilton.ca

Summary

In conclusion, the PHRED Program as highlighted through our experiences plays a significant role in educating future practitioners by providing learning opportunities, participating in classroom teaching and in influencing curriculum at both the undergraduate and graduate level. The impact is strengthened and the students' learning enriched by the involvement of others. Indeed, the students, their educational institutions and the health unit all benefit. Participating in student education is essential and an important investment in Ontario's future public health system.

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Summary of Reportable Diseases in Ontario - May, 2003

Health Units by Region	Population 2001	AIDS	Campylo.	Chicken-pox	Chlamydia	Enceph./ Meningitis	GAS	Gonorrhea
Algoma	117,200			17	21			1
North Bay	92,950			54	10			
Northwestern	75,085			21	14		5	1
Porcupine	84,755		2	44	11			1
Sudbury	188,365		1	9	22		1	3
Thunder Bay	152,800		1		26		1	1
Timiskaming	35,335							
Total - Northern	**746,490**		**4**	**145**	**104**		**7**	**7**
Eastern Ontario	185,975		2	6	13		1	1
Hastings & Prince Edward	150,805		1	10	22			2
Kingston, Frontenac & Lennox	178,065				26	1		2
Leeds, Grenville & Lanark	159,100		1				2	
Ottawa	774,070		12	259	99	1	4	11
Renfrew	96,465		1		6			
Total- Eastern	**1,544,480**		**17**	**275**	**166**	**2**	**7**	**16**
Durham	506,900		7	148	59	2	3	5
Haliburton-Kawartha	151,770		3		13		2	1
Muskoka-Parry Sound	80,500	2		2	7			
Peel	988,950		14	518	130	6	1	22
Peterborough	125,860		1	27	14	2	1	
Simcoe	377,030		2		53	2		2
Toronto - total	2,481,495	2	66	474	525	10	9	136
North			*15*	*66*	*119*	*1*	*3*	*14*
South		*2*	*23*	*92*	*167*	*6*	*2*	*68*
East			*14*	*171*	*159*	*1*	*2*	*26*
West			*14*	*145*	*80*	*2*	*2*	*28*
York	728,980		23	99	51	1	1	3
Total - Central East	**5,451,485**	**4**	**116**	**1268**	**852**	**23**	**17**	**169**
Grey Bruce	152,380		2	6	15			
Elgin-St. Thomas	81,560		1	19	10			
Huron	59,695			4	2			
Chatham-Kent	107,705		3	16	6			1
Lambton	124,295		1					
Middlesex-London	403,180		8		33	1	2	4
Oxford	99,265		2		5	2		
Perth	73,680		2	16	1			
Windsor-Essex	374,985		11		44	1	1	3
Total - Southwest	**1,476,745**		**30**	**61**	**116**	**4**	**3**	**8**
Brant	118,085	1		96	14		1	
Haldimand-Norfolk	104,580		3	7	9			
Halton	375,230		12	33	17	1		4
Hamilton	490,270		8	21	76		3	8
Niagara	410,570		17	128	33	1	2	8
Waterloo	438,515		10		53	1	3	3
Wellington-Dufferin-Guelph	238,315		10	10	19			2
Total - Central West	**2,175,565**	**1**	**60**	**295**	**221**	**3**	**9**	**25**
May 2003	**11,394,765**	**5**	**227**	**2044**	**1459**	**32**	**43**	**225**
*** Total YTD 2003**	**-**	**37**	**1088**	**7954**	**7386**	**141**	**225**	**1177**
*** Total YTD 2002**	**-**	**48**	**1373**	**9024**	**7483**	**163**	**191**	**1223**

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** Infectious Syphilis cases include 'Primary, Secondary and Early Latent' staging effective January 1, 2003

* Adjusted for deletions and late reports.

Summary of Reportable Diseases in Ontario - May, 2003

Health Units by Region	Population 2001	Hepatitis A	Hepatitis B	Hepatitis C	Hib	Influenza	Measles	Meningo-coccal
Algoma	117,200		1	5				
North Bay	92,950			3		1		
Northwestern	75,085			2				
Porcupine	84,755			1		1		
Sudbury	188,365			6		1		1
Thunder Bay	152,800			9				
Timiskaming	35,335							
Total - Northern	**746,490**		**1**	**26**		**3**		**1**
Eastern Ontario	185,975			3				
Hastings & Prince Edward	150,805			2				
Kingston, Frontenac & Lennox	178,065			3				
Leeds, Grenville & Lanark	159,100			4		2		
Ottawa	774,070	1		32				
Renfrew	96,465			1				
Total- Eastern	**1,544,480**	**1**		**45**		**2**		
Durham	506,900	1						
Haliburton-Kawartha	161,770			9		1		1
Muskoka-Parry Sound	80,500							
Peel	988,950	1		35		2		
Peterborough	125,860			13				
Simcoe	377,030			20				1
Toronto - total	2,481,495	2	7	109		8		1
North			*1*	*28*		*3*		
South		*1*	*1*	*41*		*1*		*1*
East			*4*	*31*		*4*		
West		*1*	*1*	*9*				
York	728,980	1		10				
Total - Central East	**5,451,485**	**5**	**7**	**196**		**11**		**3**
Grey Bruce	152,380		1	6				
Elgin-St. Thomas	81,560		1		1			
Huron	59,695							
Chatham-Kent	107,705			2				
Lambton	124,295							
Middlesex-London	403,180			18				1
Oxford	99,265							
Perth	73,680							
Windsor-Essex	374,985	1		12				
Total - Southwest	**1,476,745**	**1**	**2**	**38**	**1**			**1**
Brant	118,085			1				
Haldimand-Norfolk	104,580			2				
Halton	375,230			6	1			
Hamilton	490,270	2		22				
Niagara	410,570			23				
Waterloo	438,515			13				
Wellington-Dufferin-Guelph	238,315	1	1	2		1		
Total - Central West	**2,175,565**	**3**	**1**	**69**	**1**	**1**		
May 2003	**11,394,765**	**10**	**11**	**374**	**2**	**17**		**5**
*** Total YTD 2003**	**-**	**52**	**37**	**2,056**	**4**	**436**	**4**	**24**
*** Total YTD 2002**	**-**	**48**	**55**	**2,265**	**1**	**2167**		**25**

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Summary of Reportable Diseases in Ontario - May, 2003

Health Units by Region	Population 2001	Mumps	Pertussis	Rubella	Salmon.	Shigellosis	Syphilis Infectious**	VTEC
Algoma	117,200		2					
North Bay	92,950				1			
Northwestern	75,085	1						
Porcupine	84,755				1			
Sudbury	188,365		1		1			
Thunder Bay	152,800				2			1
Timiskaming	35,335							
Total - Northern	**746,490**	**1**	**3**		**5**			**1**
Eastern Ontario	185,975		1			1		
Hastings & Prince Edward	150,805				1			
Kingston, Frontenac & Lennox	178,065							
Leeds, Grenville & Lanark	159,100		1		2			1
Ottawa	774,070		7	1	11	3		3
Renfrew	96,465				1			
Total- Eastern	**1,544,480**		**9**	**1**	**15**	**4**		**4**
Durham	506,900		2		4	1	1	1
Haliburton-Kawartha	161,770				2		1	
Muskoka-Parry Sound	80,500		1					
Peel	988,950				20	6		3
Peterborough	125,860		6		1			
Simcoe	377,030		4		1			
Toronto - total	2,481,495		2		43	8	21	8
North			*1*		*6*	*2*		*2*
South					*16*	*3*	*18*	
East			*1*		*10*	*1*	*2*	*4*
West					*11*	*2*	*1*	*2*
York	728,980		1		10	2		
Total - Central East	**5,451,485**		**16**		**81**	**17**	**23**	**12**
Grey Bruce	152,380							
Elgin-St. Thomas	81,560		1		2			
Huron	59,695				1			
Chatham-Kent	107,705							
Lambton	124,295							
Middlesex-London	403,180		2		4			
Oxford	99,265				1			1
Perth	73,680				2			
Windsor-Essex	374,985				3	1		
Total - Southwest	**1,476,745**		**3**		**13**	**1**		**1**
Brant	118,085							
Haldimand-Norfolk	104,580		1		3			
Halton	375,230		1	1	4	1		3
Hamilton	490,270				3			1
Niagara	410,570		2		13			1
Waterloo	438,515				8		1	
Wellington-Dufferin-Guelph	238,315				2	1	1	1
Total - Central West	**2,175,565**		**4**	**1**	**33**	**2**	**2**	**6**
May 2003	**11,394,765**	**1**	**35**	**2**	**147**	**24**	**25**	**24**
*** Total YTD 2003**	**-**	**8**	**112**	**5**	**686**	**123**	**116**	**154**
*** Total YTD 2002**	**-**	**6**	**151**	**1**	**851**	**638**	**52**	**77**

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Just walking to the grocery Store...
Even a little regular physical activity makes a healthy difference!
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